

Second Workshop on Mars Valley Networks

Moab, Utah October 19-24, 2008

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Smithsonian Institution



Workshop on Mars Valley Networks

BEST EVIDENCE OF WATER IN THE PAST

- What Were The Climatic Conditions?
- What Was The Role of Sapping Versus Surface Runoff?
- What Are Their Ages?
- What Quantitative Measurements Can Be Made?

REVIEW CURRENT KNOWLEDGE

Workshop Goals

Summary Of Current Research

*Determine Future Emphasis For
Exploration*

Workshop Topics

- How did valley networks form? What is the physical evidence for sapping and surface runoff?
- What are the ages of the valley networks and how are they related to volcanism, the global heat flow, or current climatic models?
- What do high-resolution images tell us about the probably hydraulic characteristics of valley networks, such as discharge rates or flow depth?
- Can we extract accurate watershed information regarding the valley network using Digital Elevation Models given the subsequent modification of the surface topography from impact cratering and other processes?
- Where are the space-filling, small order tributaries?
- Is it possible to produce a global map of these features to better understand the spatial and temporal variations of valley networks that is universally accepted?

Workshop Logistics

- Workshop Took Place In Moab, Utah From October 19-24, 2008
- Attended by 26 Scientists From 5 Countries
- 20 Abstracts Published And Available Online
www.nasm.si.edu/marsvalleynetworks
- 21 Talks Presented Over 4 Day Period
- NASA Funded Travel For 2 Students

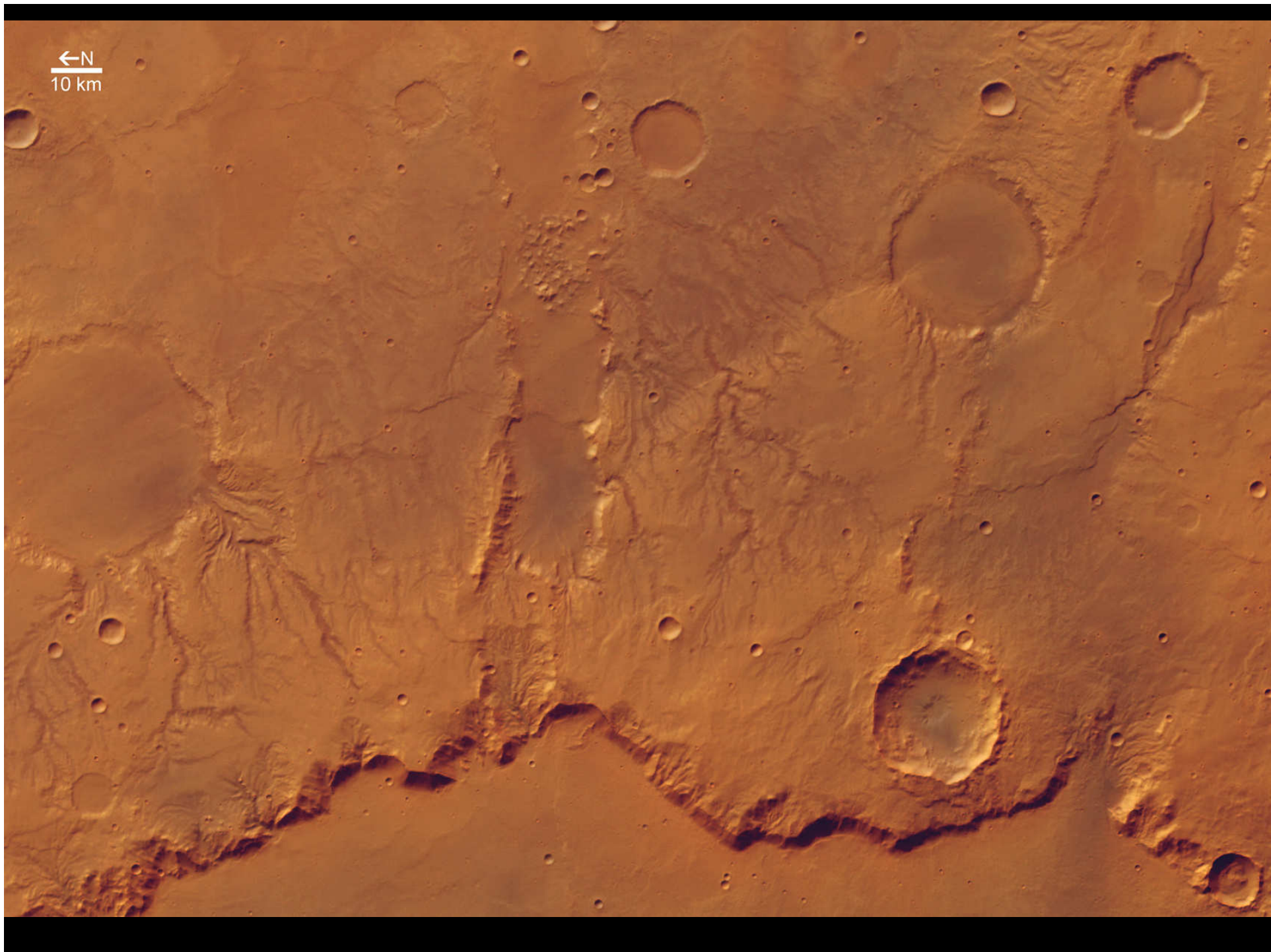


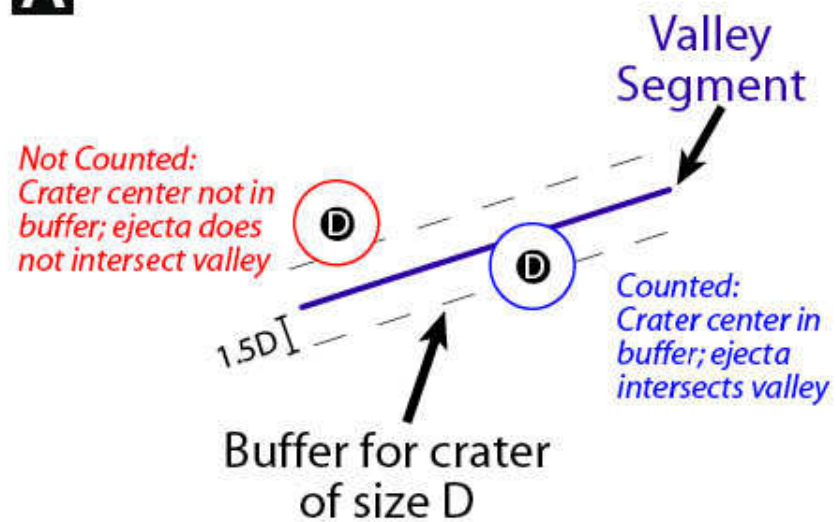
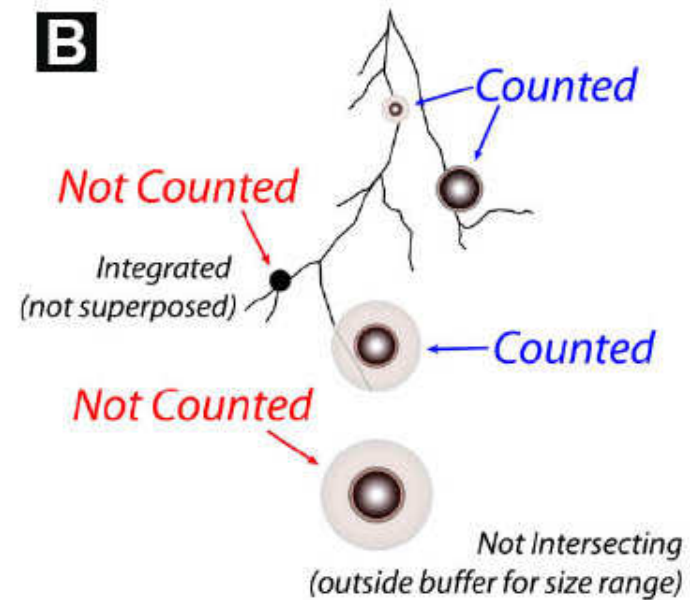




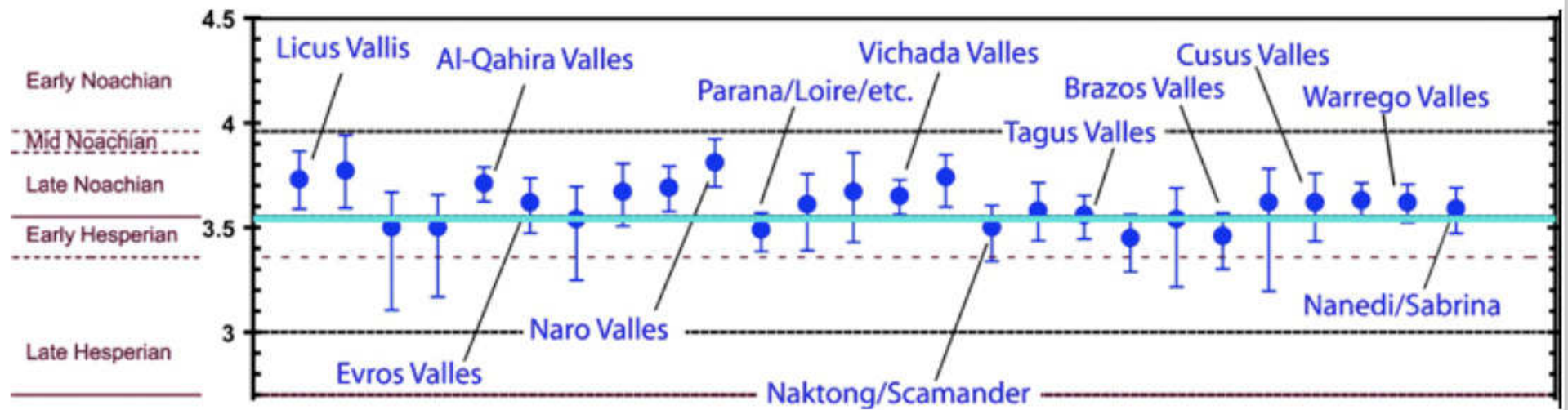
An aerial photograph of a desert landscape, likely in the southwestern United States, showing a winding river or dry riverbed cutting through a vast, arid plain. The terrain is characterized by various shades of brown and tan, with some darker, more textured areas that could be ancient riverbeds or geological formations. The word "Ages" is superimposed in the center of the image in a bold, yellow, sans-serif font.

Ages



A**B**

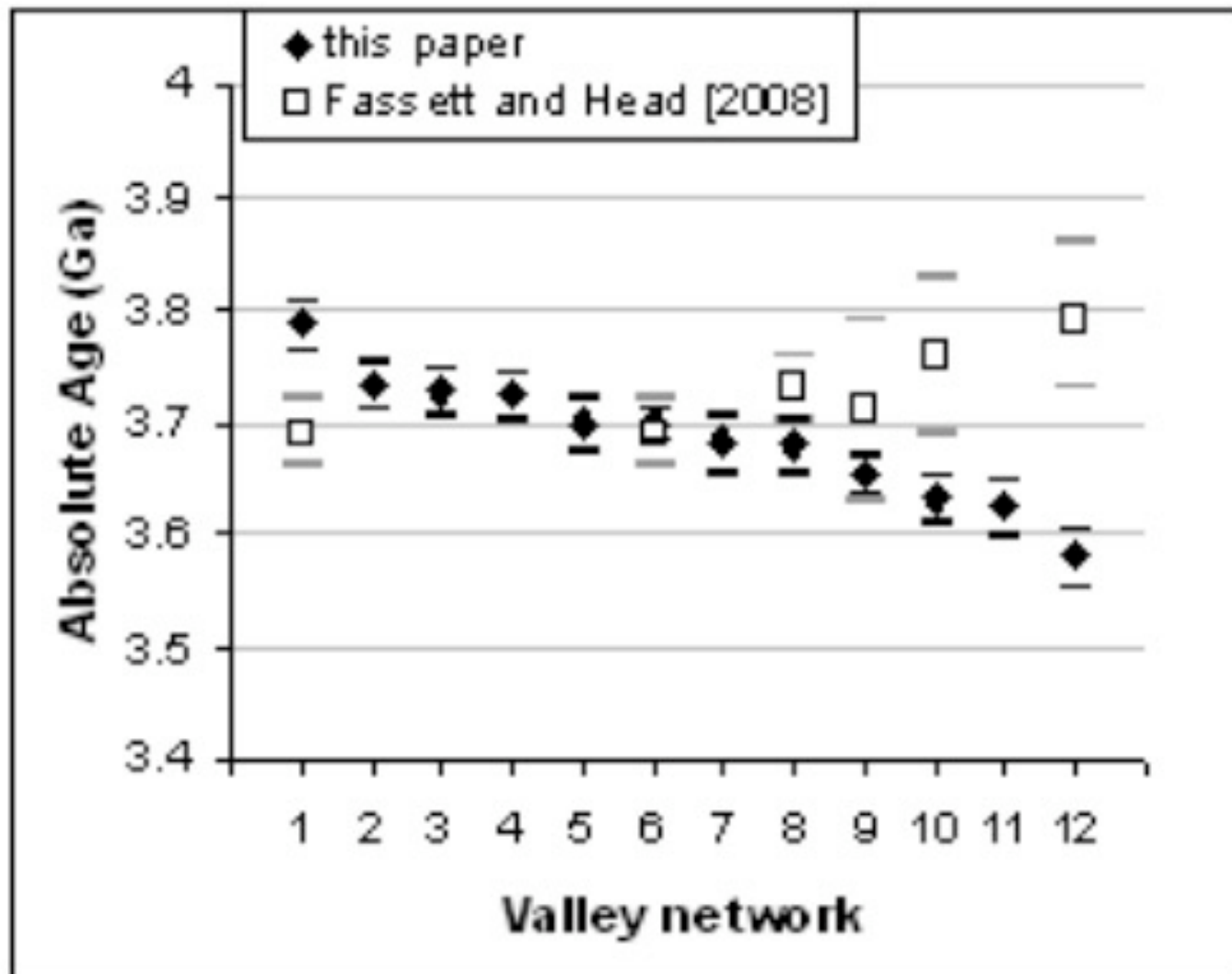
Buffered Crater Counting Technique
Fassett and Head [2007]



Fassett and Head [2007]



Hi-Rise Image of Mawrth Vallis



Hoke and Hynek [2008]



Drainage Density

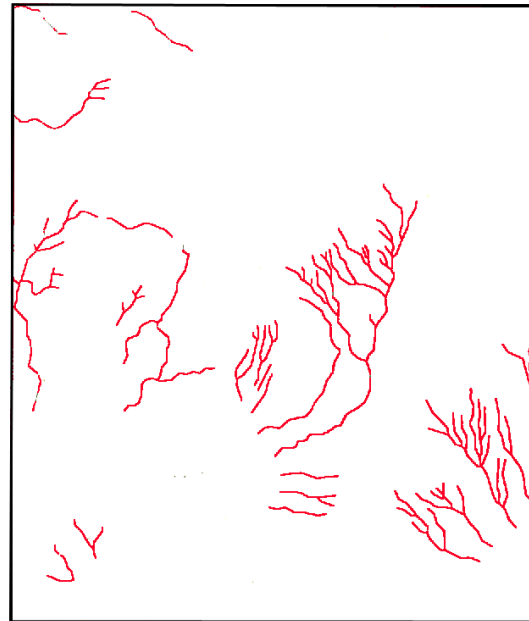
Martian Drainage Densities

Background

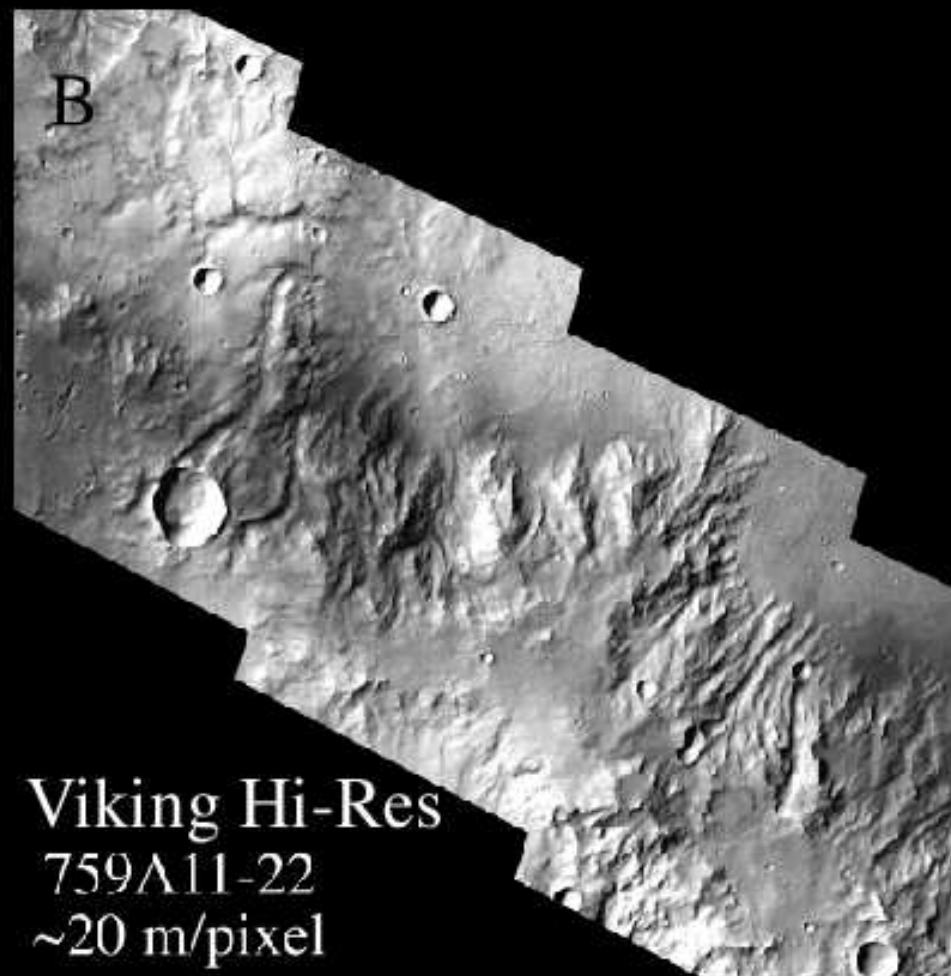
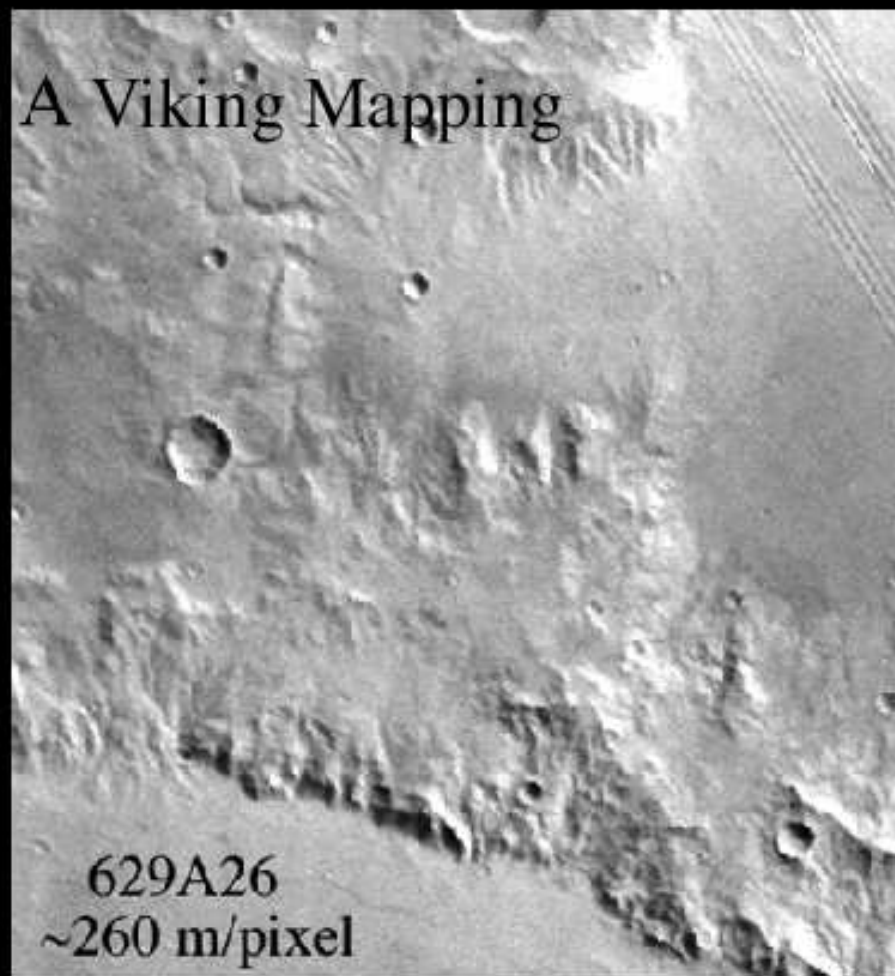
- Carr and Chuang [1997] Made Quantitative Comparison:
 - Drainage densities are extremely low (10^{-3} - 10^{-6} km $^{-1}$)
 - Results are subjective



Earth



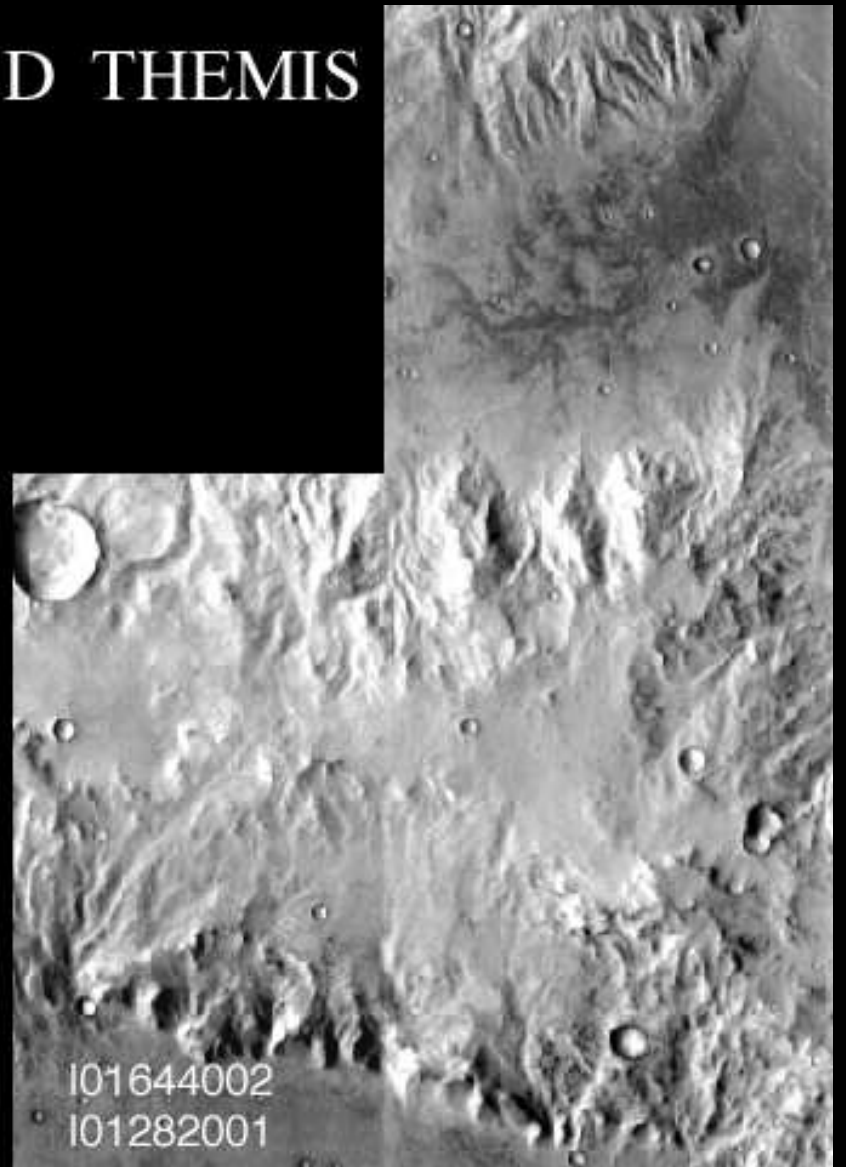
Mars

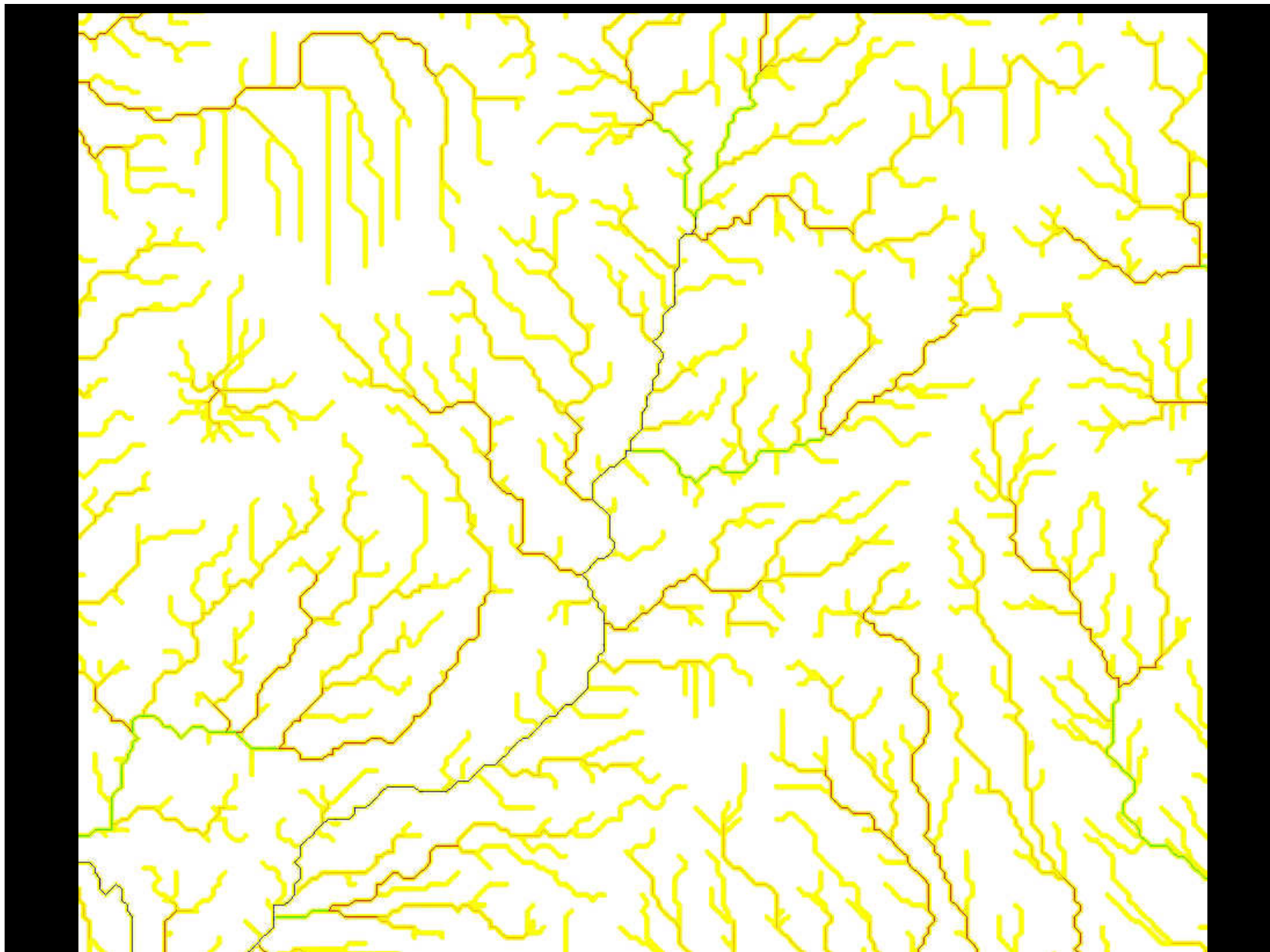


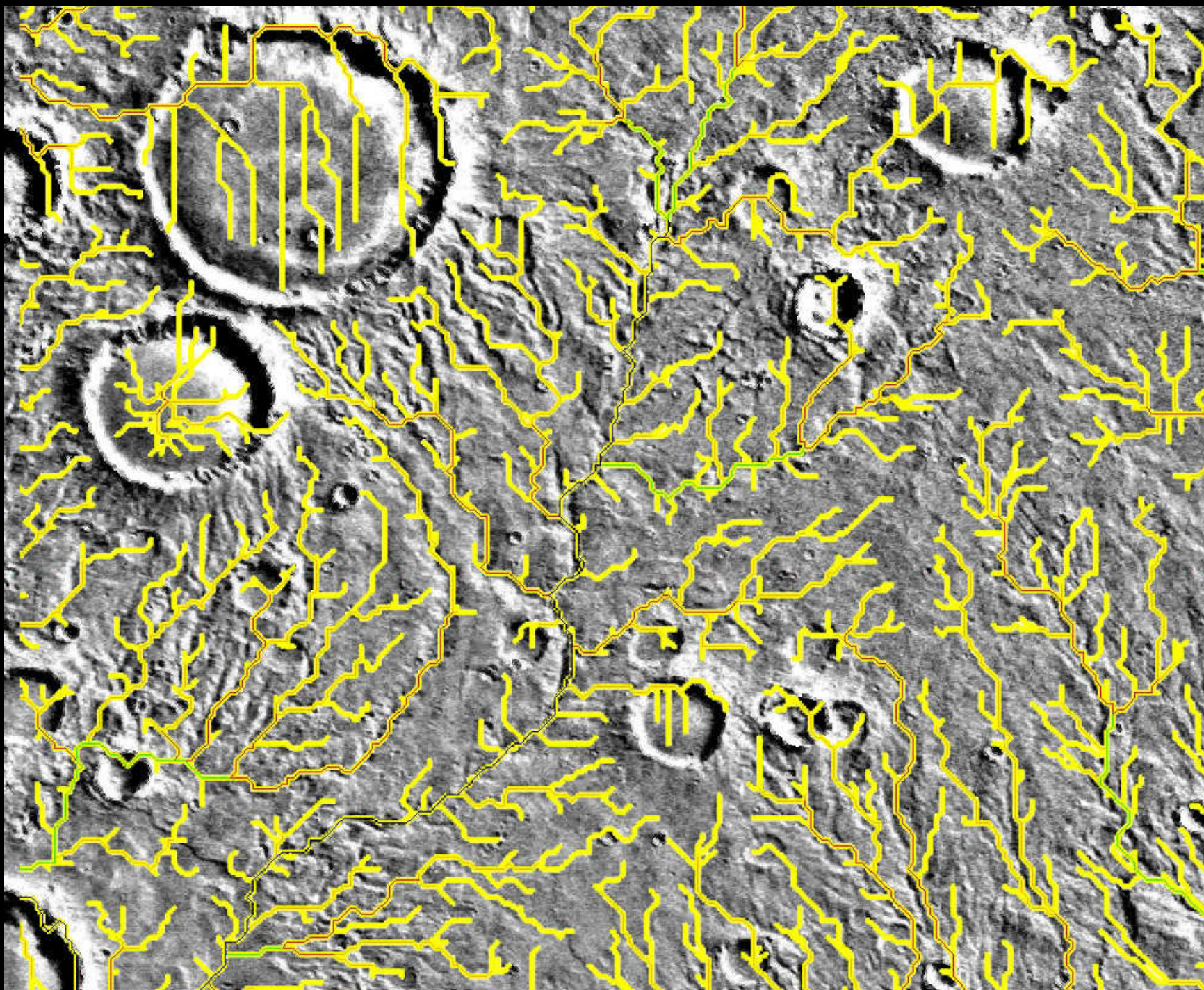
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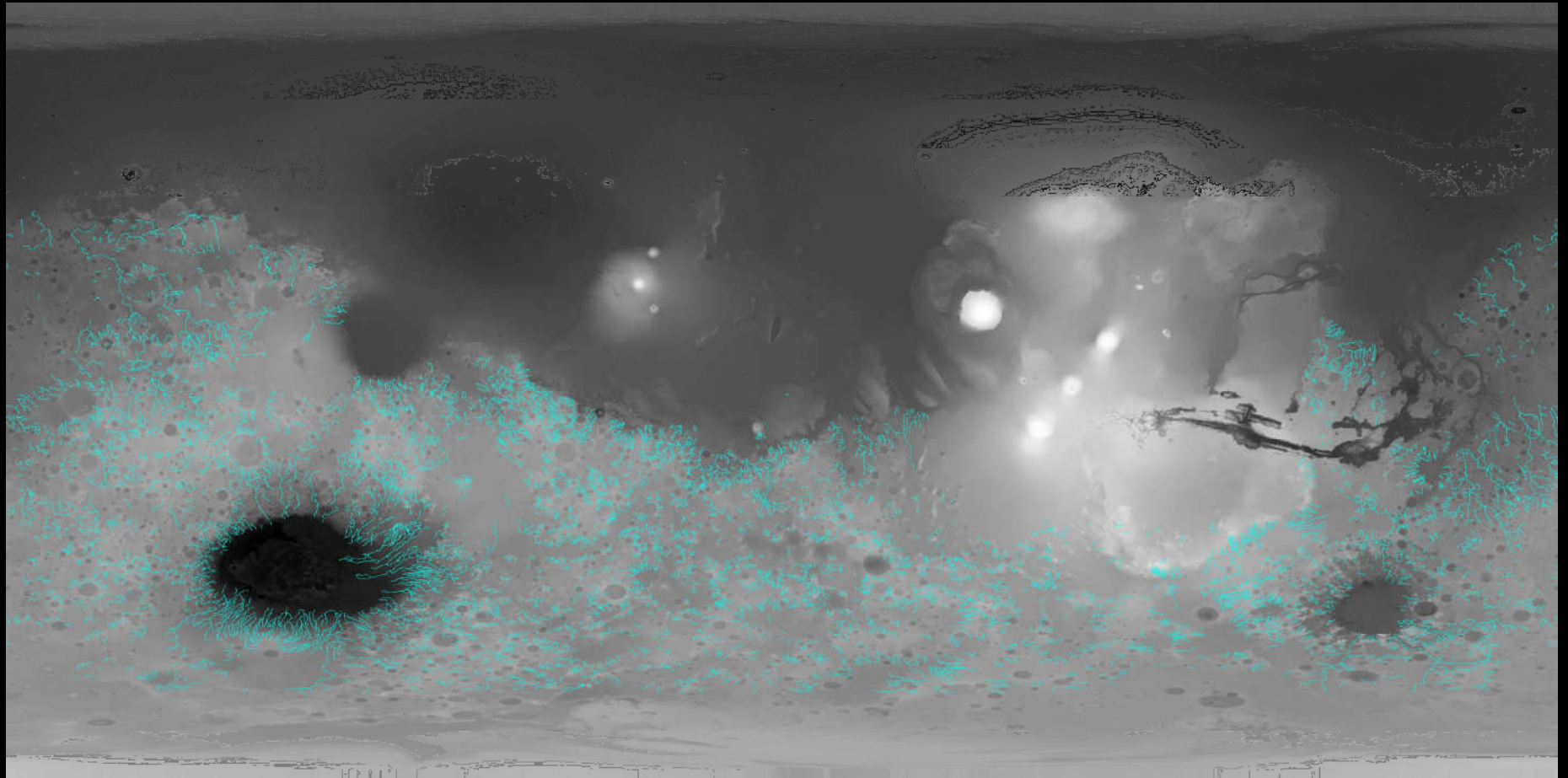


D THEMIS









Global Map of Mars Valley Networks
Alan Howard, University of Virginia



Formation Processes



*Valley Network in
Terra Meridiani*

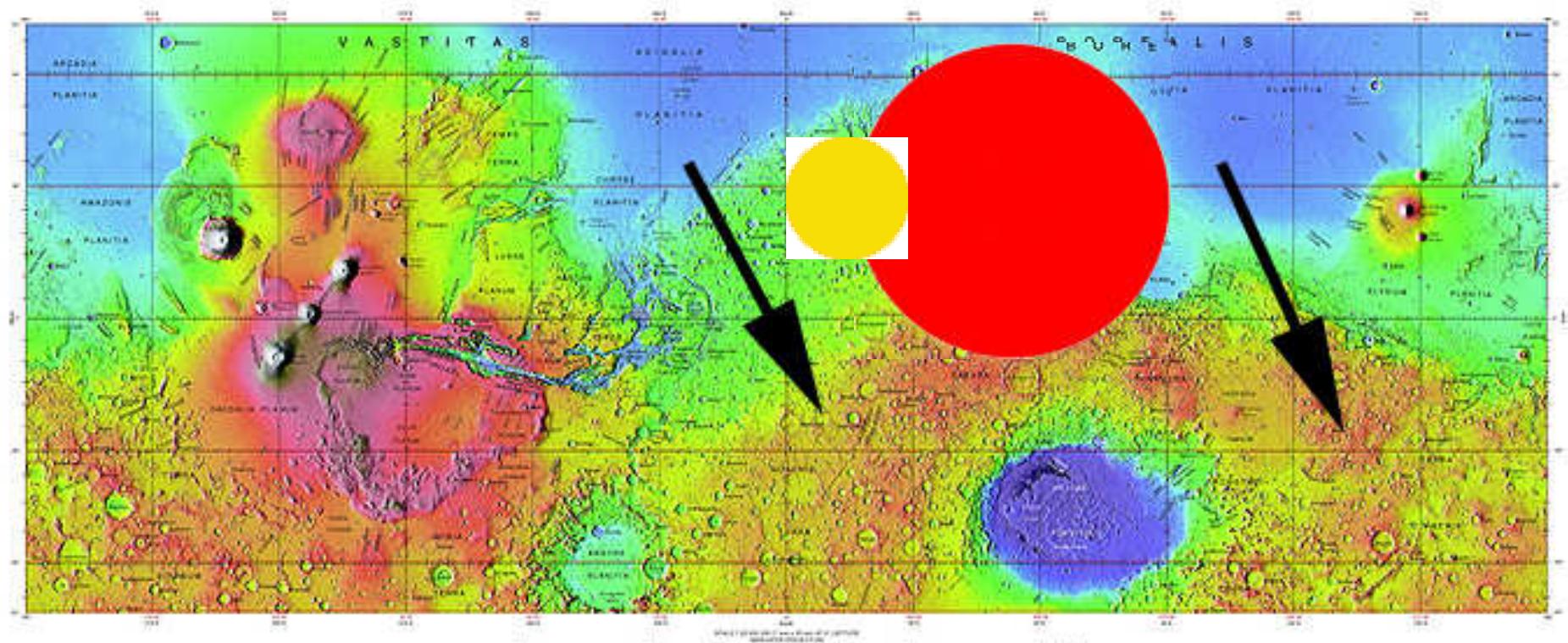
Nanedi Valles

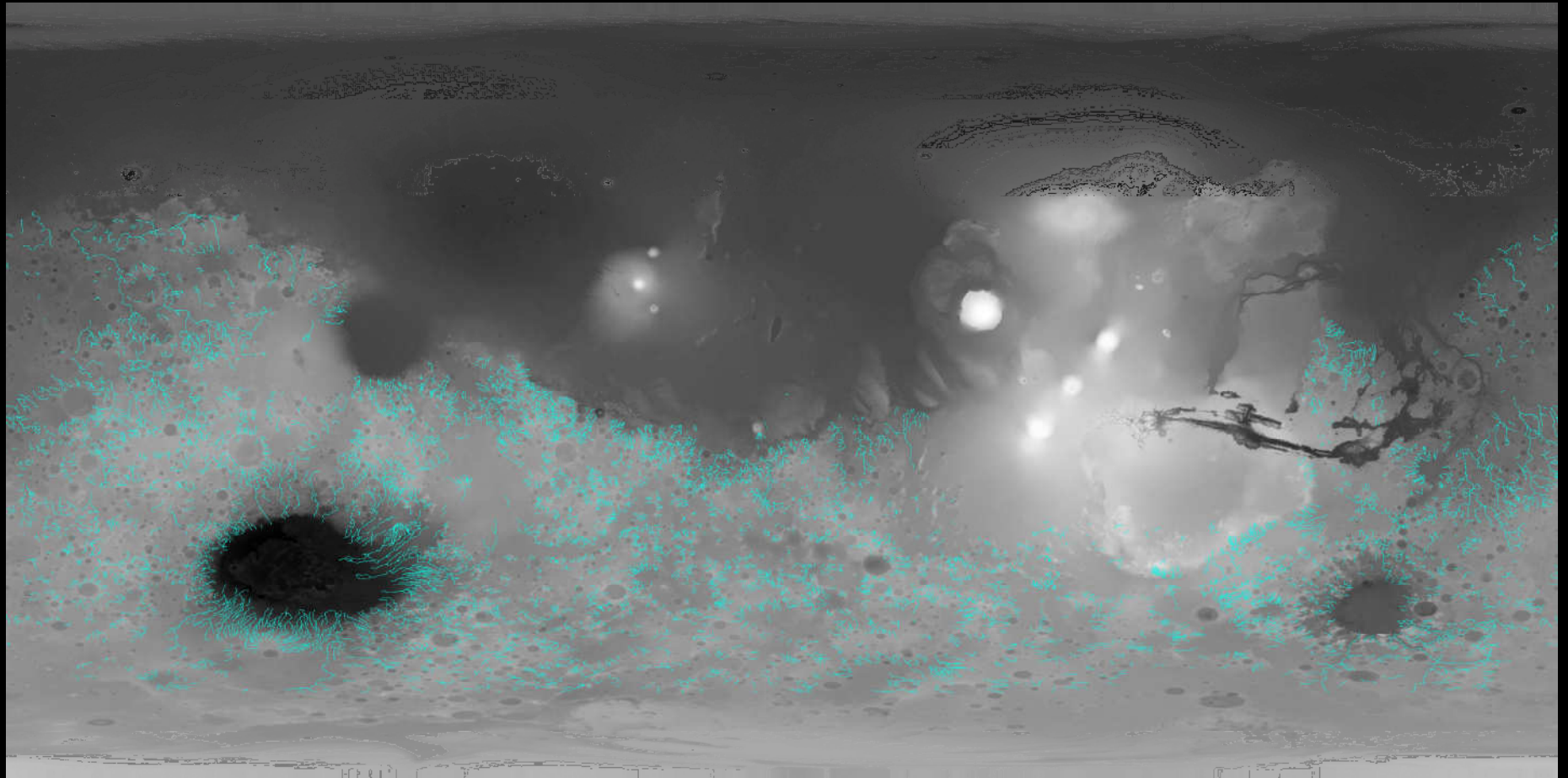






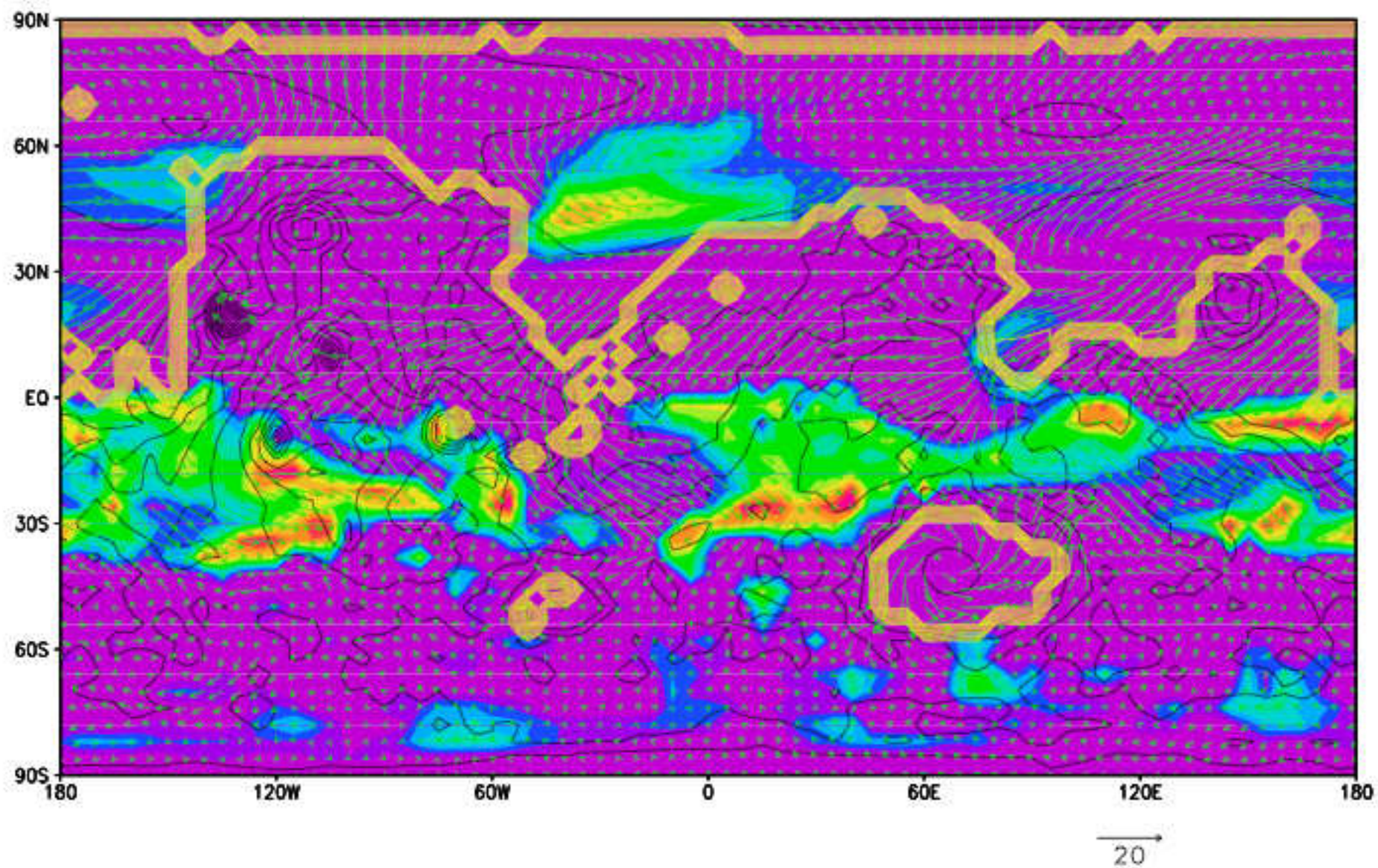
Climatic Implications

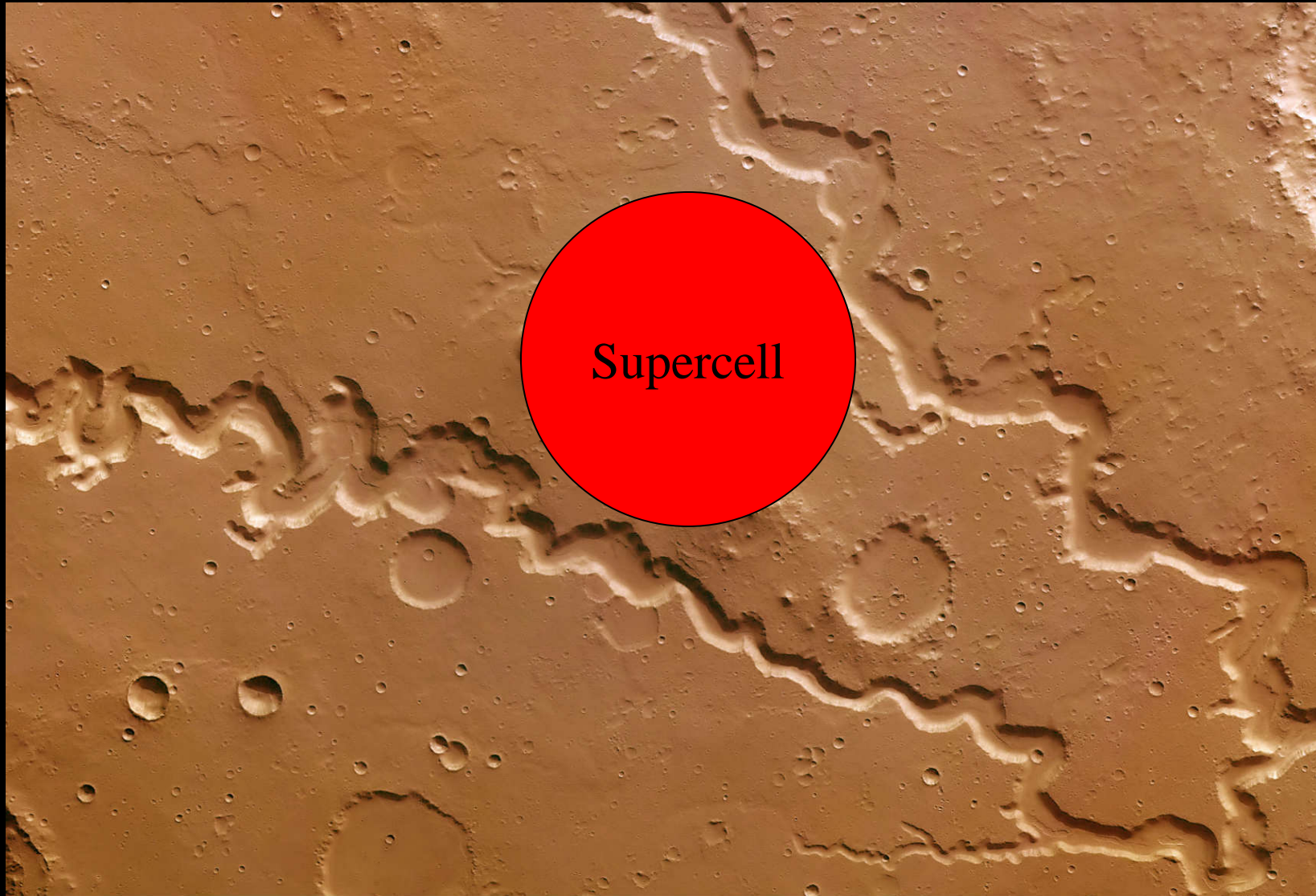




Global Map of Mars Valley Networks
Alan Howard, University of Virginia

CAM Mearth Jan Rain and Winds





© ESA/DLR/FU Berlin (G. Neukum)

N →
10 km

Nanedi Valles >800 km long



Mars Valley Networks

Future Exploration

- How Long Does It Take to Form an Individual Valley Network?
- How “Strongly” Did It Need to Precipitate?
- How Completely “Filled” Are the Drainage Densities?
 - Does It Look Like We Had Few Individual Rain Events?
 - How Much of the Patchiness Is Caused by Preservation?
- What Is the Current Consensus on Whether There Could Have Been Large Standing Bodies of Water (Hellas Sea, Northern Ocean)?
- Erosion Rates on Noachian Terrain:
 - Equivalent Exposure Age for Terrestrial Deserts?
- Conflict With Mineralogical Data If It Were Able to Rain Continuously (Desert) for 10^6 , 10^7 , 10^8 , 10^9 Years?